The Introduction into Western Australia of the Frog *Limnodynastes tasmaniensis* Gunther

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INTRODUCTION

There is a number of records of the establishment of anurans in geographically extralimital areas as a result of intentional or accidental releases. The intentional introductions are usually well documented, such as the initial release of *Bufo marinus* in Australia (Mungomery, 1935), and the repeated releases of three Australian species of *Litoria* in New Zealand (McCann, 1961). However, we are unaware of any documented accounts of the establishment of an Australian species following an unintentional release.

In 1977, in the course of field studies of frogs in the East Kimberley region of north-western Australia, we found a small population of the frog *Limnodynastes tasmaniensis* Gunther at Kununurra. Formerly the species was known from eastern and south-eastern Australia 1,800 km distant; thus it was clearly evident that the Kimberley isolate had been introduced.

Further observations at Kununurra in 1978 revealed a significant expansion of the population there, leading us to deduce that the original introduction had occurred only a few years previously.

Here we document details of the Kununurra population and discuss the likely manner of its introduction.

Ecological Notes

Limnodynastes tasmaniensis is a moderate-sized frog (40-50 mm snout to vent length) inhabiting an extremely wide variety of environmental niches. It

occurs commonly amongst vegetation in damp situations near static or flowing water, but is adept at avoiding periods of temporary drought. For example, in the arid north-east of South Australia the frogs spend the day within fissures in the soil, emerging at night to feed. Throughout its range the species tends to be an opportunistic breeder, spawning most commonly in static water. In south-eastern Australia three call races of *L. tasmaniensis* are recognised (Loftus-Hills, 1973; Littlejohn and Roberts, 1975; Roberts, 1976).

Geographic Distribution

Limnodynastes tasmaniensis occurs in an arc from the Eyre Peninsula of South Australia to northern Queensland (Fig. 1). Moore (1961) listed a specimen from Somerset at the northern extremity of Cape York Peninsula, but Cogger (1975) indicates the northern limit to be near Townsville, and we have adopted that modification here.

FIG. 1.—The distribution of *Limnodynastes tasmaniensis* in Australia. The distribution is based on Cogger (1975), Roberts (1976) and unpublished data; the position of the Kununurra isolate is shown by an arrow.

The Kununurra Isolate

On 18 and 23 February 1977 we heard *L. tasmaniensis* calling from an area of flooded land in Coolibah Drive, Kununurra. Subsequently we recorded the calls of four individuals, and obtained a reference sample of four specimens now deposited in the Western Australian Museum (WAM R58830-33).

Observations in the surrounding district established that the species was confined to the north-western periphery of the Kununurra township, extending from the junction of Coolibah Drive with the Parry Creek Road to a point 1.8 km distant on the Parry Creek Road.

In 1978 we returned to the site, and on January 25 we plotted the population in more detail by making road traverses and noting the presence or absence of calling male frogs at intervals of 300 m. The extension of range beyond the 1977 limit was considerable, involving a continuous northern extension of 6.7 km, and a total range (in road km) of 8.5 km. However, no expansion of range east or west of the road had occurred; the population was confined to a roadside zone no more than 20 m wide. A single reference specimen has been deposited in the South Australian Museum (SAM R16919).

The population is currently restricted to roadside vegetation, where cover is provided by a rich growth of mixed grasses to a height of 1 m. The road runs through flat pastures dissected by irrigation channels. The frogs breed in a continuous, shallow, flooded depression on the western side of the road, between the road and a parallel irrigation channel. In the same area we collected *Limnodynastes convexiusculus, L. ornatus, Cyclorana australis, C. cultripes, Cyclorana* sp., *Litoria nasuta* and *L. rothi.*

Call Characteristics

The call is a short, staccato rattle consisting of 5-7 notes. One individual gave calls with five or six notes; calls of the second all had six notes; and calls of the other two individuals all had seven notes. Note duration ranged from 12-16 msec and call duration from 150-228 msec. The dominant frequency of the calls of all individuals lay at 1,900-2,000 Hz.

Water temperatures at the calling sites of the four recorded individuals ranged from 29.1 to 31.2°C.

Possible Manner and Date of Introduction

We examined the vicinity of Coolibah Drive, Kununurra, seeking information about possible modes of introduction of the frogs. Several of the nearby houses were pre-constructed transportable units, and enquiries revealed that these had been imported from South Australia. The manufacturer is Atlas Industrial Housing Pty Ltd, whose construction plant is at Pooraka, 12 km north of Adelaide. Enquiries directed to the manufacturer showed that the company had provided the transportable modular accommodation at the Lake Argyle construction camp

(now the Lake Argyle Tourist Village), and several hundred transportable homes throughout Kununurra. Most of the latter homes had been despatched from Adelaide between 1969 and 1971.

Resting directly on the soil at Pooraka prior to transportation, the home foundations would have provided ideal refuges for *L. tasmaniensis*. The frogs often form aggregations of a dozen or more during dry conditions (our unpublished observations); this could result in a number adequate for colonisation being transported together. We suggest that *L. tasmaniensis* was introduced into W.A. via one or more of the units.

The substantial expansion of the range of the population observed between February, 1977, and January, 1978, is best accounted for in terms of an extremely recent introduction. For this reason we suggest 1971, this being the last possible date for entry via the transportable homes.

DISCUSSION

Roberts (1976) showed that only one call race of *L. tasmaniensis,* the Western, occurs west of the Murray River in South Australia. Hence our supposition that the Kununurra population of *L. tasmaniensis* originated in the Adelaide area can be tested by comparing the call structure of the Kununurra isolate with that of the Western Call Race.

Unfortunately the temperatures at which our recordings were made considerably exceed those in Roberts' study (6.0-25.0°C); thus direct comparisons are not valid. However, the most striking call difference between the three races is in the number of notes per call; values are generally 1 in the Southern Race, 2-4 in the Northern Race and 3-8 in the Western Race (Roberts, 1976). In this characteristic the Kununurra population coincides with the Western Call Race, and the other aspects of call structure analysed, except dominant frequency, also fall within the range of this race. Dominant frequency of the Kununurra population lies above the range recorded by Roberts; possibly this is a temperature effect.

Thus the call data are consistent with the hypothesis of an Adelaide origin of the Kununurra population of *L. tasmaniensis*.

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